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Physical Symptoms in Young Adults and Their Use of Different Computers and Mobile Phones

Leena Korpinen

Environmental Health, Tampere University of Technology, Tampere, Finland
Faculty of Medicine, University of Tampere, Tampere, Finland

Rauno Pääkkönen

Finnish Institute of Occupational Health, Tampere, Finland

This paper presents the use of new technical equipment by young adults (30 years old or younger), and the physical symptoms they have. The paper then analyses how the symptoms are associated with the use of computers and mobile phones, taking into account the background information. The study is based on a survey of 15 000 working-age (18–65) Finns. The responses (1563) covering young adults' physical symptoms were analysed. Altogether 53.3% of all young adults had pretty often or more frequently pain, numbness or aches in the neck and 32.2% had aches in the hip and lower back. Women experienced more pain, numbness or aches in the neck (65.0%) than men (34.5%). The use of different computers at leisure quite often had an association with some symptoms in different parts of the body. In addition, exhaustion at work had associations with some physical symptoms. In the future, it is essential to note ergonomic reasons and exhaustion at work when young adults experience pain, numbness or aches.

physical symptoms questionnaire computer mobile phone

1. INTRODUCTION

Musculoskeletal diseases involving the neck or shoulder region are quite common. Different physical and psychosocial factors, both from work and leisure time, have been identified as being associated with neck/shoulder pain, and disorders [1, 2, 3, 4, 5, 6, 7, 8, 9]. Village, Rempel and Teschke published a review article, where they concluded that there was consistent evidence of a positive relationship across numerous prospective and cross-sectional studies with increased risk most pronounced beyond 20 h/week of computer use or with increasing years of computer work [10]. For example, the risk of carpal tunnel syndrome increased with the use of a computer, especially with mouse use for 20 h/week or more [10].

In Finland chronic neck syndrome was diagnosed in 13.5% of the women and 9.5% of the men [11] and in a Norwegian study the prevalence of experienced chronic neck pain was 13.8% [12]. In the Fourth European Working Conditions Survey, workers reported individual symptoms, e.g., backache 24.7%, muscular pain 22.8% and headaches 15.5% [13]. In another Finnish study, 3122 persons aged 25–64 were interviewed by phone [14]. There were 2229 working persons (51% male and 49% female). Symptoms of

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Correspondence and requests for offprints should be sent to Leena Korpinen, EPR, Environmental Health, Tampere University of Technology, P.O. Box 589, 33101 Tampere, Finland. E-mail: <leena.korpinen@tut.fi>.

physical and connective tissue disorders were asked about; they included pain in neck/shoulder 48%, pain in arms and shoulder 32%, hip and lower back pain 28%, pain in hips and legs 24% and pain in wrists and fingers 19% [14].

Thomée, Eklöf M, Gustafsson, et al. studied psychological symptoms of young users of information and communication technology (ICT) [15]. College students responded to a questionnaire at baseline, and at one-year follow-up. For example, different types of ICT use, perceived stress, symptoms of depression and sleep disturbances were assessed. For women, a high combined use of computer and mobile phone at baseline was associated with increased risk of reporting prolonged stress and symptoms of depression at follow-up, and for men, the number of mobile phone calls per day were associated with sleep disturbances. According to Thomée et al. ICT may have an impact on psychological health, although causal mechanisms are unclear.

In recent years the use of new technical equipment has increased. Information acquisition has been made easier with various kinds of mobile services. In the Fourth European Working Condition Survey, ~26% of workers work with a computer all or almost all of the time. In 1990, the equivalent figure was ~13% [13]. According to the Finnish statistical office (in spring 2007) nearly 4 out of 5 Finns (79%) aged 15–74, or over 3 000 000 persons, used the Internet [16]. Seventy-five percent of the population used the Internet at least once a week. Nearly all under 40-year-olds in Finland use the Internet. The use decreases after the age of 40 [16]. According to the Finnish statistical office, 99% of Finnish households had one or more mobile phones in 2008 [17]. The number of mobile phones increased by 31.8% during the 5 years between 2001 and 2006 [17, 18].

The aim of this paper is to present young adults' (30 years old or younger) physical symptoms and use of new technical equipment and analyse how the symptoms are associated with the use of desktop computers, portable computers or mini-computers, mobile phones, and background information, such as gender.

2. METHODS

2.1. Study Population

The questionnaire was sent to 15 000 Finns in October 2002. Because the study focused on the working age population, the questionnaire was only sent to people between the ages of 18 and 65. Names and addresses were obtained as a random sample from the Finnish Population Register Centre. In this way the study population represented the whole working age population relatively well. Concerning the residence and the socioeconomic status, random sampling also gave approximately the same number of men and women. All the answers were handled anonymously and the study design was approved by the Ethical Committee (Pirkanmaa Health District, Finland, decision R02099).

2.2. Questionnaire

The questionnaire was posted with a cover letter, in which the leader of the study explained the study and gave some practical instructions. The questionnaire was divided into six sections. Section 1 dealt with background information such as age, gender, marital status, education, occupation and home county. In section 2, the familiarity and use of given technical devices at leisure and at work were mapped. Examples of new technical units included desktop computers, portable computers, hand-held computers, communicators, the internet, mobile phones, electronic marketplaces/commerce, teletex, digital television and associated services. If a respondent did not have a job at the moment, he or she answered questions about leisure only.

In section 3, the focus was on physical loading and ergonomics. The section included Question 13: Have you had an ache, pain or numbness in the following body part during the past 12 months?

13a. in wrists and fingers;
13b. in elbows and forearms;
13c. in neck;
13d. in shoulders;
13e. in hip and lower back;
13f. in feet.

The respondents were also asked if they presumed these symptoms to be caused by the use of desktop or portable computers. Section 4 concerned psychological welfare and included Question 16: Have you suffered

16a. sleeping disorders/disturbances;
16b. depression;
16c. exhaustion at work;
16d. substance addiction;
16e. anxiety;
16f. fear situations during the past 12 months?

The respondents were also queried if they somehow connected these symptoms to an increase in information retrieval or informing through different electronic sources such as email, the Internet or digital television. The choices for the questions of section 3 and 4: *cannot say*, *not at all*, *sometimes*, *pretty often*, *often*, *very often* and *missing*. Accidents and close-call situations at leisure or at work were handled in section 5. It asked if mobile phones had caused or had been a partial cause of an accident or a close-call situation. The last part was an open-ended question "other observations concerning technology and health". A lottery ticket was attached, too; however, it was handled separately from the answers, so privacy was ensured. The details of the questionnaire have been reported earlier [19].

2.3. Statistical Analysis

First, only persons 30 years old or younger were chosen. Statistical analyses were done with PASW Statistics version 18 (formerly known as SPSS), and consisted of General Linear Models with the symptoms assigned as target variables. Certain procedures were also made for the explanatory variables. The options to Question 13 were classified so that answers *cannot say*, *not at all* and *sometimes* were 0 (no symptoms), *pretty often*—1, *often*—2, *very often*—3. In addition, mental symptoms (Question 16) were codified in the same way.

In the analyses for Question 13, the models factors were gender, marital status, use of portable computer or mini-computer at leisure (Q8e), use of desktop computer at leisure (Q8b), some mental symptoms from Question 16 (Q16a–f); and two-way interactions gender × marital status, gender × Q8e, gender × Q8b, gender × Q16a–f, marital status × Q8e, marital status × Q8b, marital status × Q16a–f, Q8e × Q8b, Q8e × Q16a–f, Q8b × Q16a–f. Then the data were divided into subgroups based on gender. In these models the factors were occupation, Q8e, Q8b, marital status, some mental symptoms from Question 16 (Q16a–f); and two-way interactions occupation × Q8e, occupation × Q8b, occupation × marital status, occupation × Q16a–f, Q8e × Q8b, Q8e × marital status, Q8e × Q16a–f, Q8b × marital status, Q8b × Q16a–f, marital status × Q16a–f. This paper presents particularly the results of the models with exhaustion at work (Q16c), because exhaustion at work was the most common mental symptom.

In addition, the data were divided into subgroups based on occupational activity and use of computers:

1. occupationally nonactive and not using a computer at leisure;
2. occupationally nonactive and using a computer at leisure;
3. occupationally active, not using a computer either at work or at leisure;
4. occupationally active, not using a computer at work but using it at leisure;
5. occupationally active, using a computer at work but not at leisure and
6. occupationally active, using a computer at work and at leisure.

In the subgroups, the use of computers was classified so that answers *weekly* and *daily* were included in the subgroups who used computers, and answers *cannot say*, *not at all*, *less than monthly* and *monthy* were included in the subgroups which did not use computers. The same statistical models which we used for all data (persons 30 years old or younger) were used for the subgroups.

3. RESULTS

3.1. Background Information

During the winter 2002/2003, 6121 responses arrived. Thus the response rate was 41%. Mean age ± *SD* was 41.3 ± 13.1 years. The data included 1563 persons who were 30 years old or younger. The young adults' age was 24.1 ± 3.6 years. In this age group there were 956 women and 604 men. The men were 18–30 years old (24.3 ± 3.7) and the women were 16–30 years old (24.0 ± 3.6). Table 1 presents background information of all young persons: young women, young men, young working women and young working men.

In the part on experienced pain, numbness or aches, the results were based on Question 13. Table 1 presents the number of *yes* answers (*pretty often*, *often*, *very often*). In the part on mental symptoms, the results are based on Question 16. The table shows the number of *yes* answers (*pretty often*, *often*, *very often*). Table 2 presents the use of mobile phones, desktop

TABLE 1. Background Information and Symptoms (Experienced Pain, Numbness or Aches and Mental Symptoms) for All Young Persons, Young Women, Young Men, Young Working Women and Young Working Men (%)

Topic	All	(%)	Women	(%)	Men	(%)	Working Women	(%)	Working Men	(%)
Q3 Marital status										
single	824	52.8	475	49.7	347	57.5	219	42.6	187	47.3
married or live-in	723	46.3	470	49.2	252	41.7	290	56.4	204	51.6
divorced	13	0.8	9	0.9	4	0.7	5	1.0	3	0.8
widow or widower	2	0.1	1	0.1	1	0.2	—	—	1	0.3
Q5 Education										
comprehensive school	157	10.1	93	9.7	63	10.4	19	3.7	25	6.3
matriculation	412	26.4	280	29.4	130	21.6	109	21.2	42	10.6
vocational school	395	25.3	193	20.2	202	33.5	111	21.6	154	39.0
vocational high school	410	26.3	278	29.1	132	21.9	197	38.3	117	29.6
university	186	11.9	110	11.5	76	12.6	78	15.2	57	14.4
Q6 Occupation										
none[a]	19	1.2	7	0.7	12	2.0	—	—	—	—
entrepreneur	35	2.2	15	1.6	19	3.2	12	2.3	18	4.6
farmer	17	1.1	10	1.0	7	1.2	4	0.8	4	1.0
upper-level white-collar workers[b]	165	10.6	80	8.4	85	14.1	75	14.6	81	20.6
lower-level white-collar workers[c]	253	16.2	175	18.3	78	12.9	138	26.8	69	17.5
blue-collar workers[d]	597	38.2	335	35.0	261	43.3	237	46.0	191	48.5
home work, student	403	25.8	284	29.7	119	19.7	26	5.0	18	4.6
other	73	4.7	50	5.2	22	3.6	23	4.5	13	3.3
Q13 Experienced pain, numbness or aches										
in wrists or fingers	207	13.4	135	14.2	72	12.0	74	14.4	51	12.9
in elbows or forearms	79	5.1	45	4.7	34	5.7	30	5.8	25	6.4
in neck	830	53.3	619	65.0	208	34.5	342	66.5	148	37.6
in shoulders	344	22.1	250	26.4	94	15.7	144	28.0	72	18.3
in hip and lower back	500	32.2	342	35.9	158	26.3	183	35.5	117	29.8
in feet	300	19.3	211	22.1	89	14.8	117	22.8	55	14.0
Q16 Mental symptoms										
sleeping disorders/disturbances	200	12.8	129	13.5	71	11.8	69	13.5	45	11.4
depression	166	10.6	117	12.3	49	8.2	61	11.9	26	6.6
exhaustion at work	259	16.6	176	18.5	83	13.8	115	22.4	64	16.2
substance addiction	29	1.8	11	1.1	18	3.1	5	1.0	9	2.3
anxiety	145	9.3	106	11.2	39	6.5	51	10.0	18	4.5
fear situations	67	4.3	46	4.7	21	3.5	22	4.3	12	3.0

Notes. a—never had an occupation; b—administrative or managerial duties, designing, research, teaching; c—clerical duties and supervision; d—industrial workers, distribution and service trade.

computers, portable computers or mini-computers at leisure or at work. In the table, there are responses of all young persons (30 years old or younger): young women, young men, young working women and young working men.

TABLE 2. The Use of Mobile Phones, Desktop Computers, Portable Computers or Mini-Computers at Leisure or at Work for All Young Persons (30 Years Old or Younger), Young Women, Young Men, Young Working Women and Young Working Men (%)

Use of Phone/Computer	All	(%)	Women	(%)	Men	(%)	Working Women	(%)	Working Men	(%)
Q8 Use at leisure										
a. mobile phone										
cannot say	1	0.1	1	0.1	—	—	1	0.2	—	—
not at all	8	0.5	5	0.5	3	0.5	—	—	2	0.5
less than monthly	4	0.3	1	0.1	3	0.5	—	—	1	0.3
monthly	4	0.3	3	0.3	1	0.2	1	0.2	—	—
weekly	62	4.0	26	2.7	36	6.0	8	1.6	23	5.8
daily	1483	94.9	920	96.2	560	92.9	505	98.1	369	93.4
b. desktop computer										
cannot say	3	0.2	2	0.2	1	0.2	1	0.2	—	—
not at all	113	7.2	62	6.5	51	8.5	31	6.0	40	10.1
less than monthly	117	7.5	75	7.8	42	7.0	45	8.7	38	9.6
monthly	162	10.4	118	12.3	44	7.3	63	12.2	30	7.6
weekly	583	37.3	395	41.3	185	30.7	215	41.7	123	31.1
daily	584	37.4	304	31.8	280	46.4	160	31.1	164	41.5
e. portable computer or mini-computer										
cannot say	4	0.3	3	0.3	1	0.2	—	—	—	—
not at all	1060	67.9	708	74.1	350	58.0	369	71.7	223	56.5
less than monthly	220	14.1	112	11.7	107	17.7	63	12.2	69	17.5
monthly	85	5.4	42	4.4	43	7.1	25	4.9	26	6.6
weekly	113	7.2	61	6.4	52	8.6	41	8.0	40	10.1
daily	79	5.1	29	3.0	50	8.3	17	3.3	37	9.4
Q11 Use at work										
a. mobile phone										
cannot say	4	0.4	2	0.4	2	0.5	2	0.4	2	0.5
not at all	323	35.1	236	45.3	87	21.9	231	44.9	86	21.8
less than monthly	54	5.9	39	7.5	15	3.8	39	7.6	15	3.8
monthly	42	4.6	22	4.2	20	5.0	21	4.1	20	5.1
weekly	114	12.4	62	11.9	52	13.1	62	12.0	51	12.9
daily	383	41.6	160	30.7	222	55.8	160	31.1	220	55.8
b. desktop computer										
cannot say	1	0.1	1	0.2	—	—	—	—	—	—
not at all	197	21.5	104	20.0	93	23.5	100	19.5	91	23.2
less than monthly	42	4.6	23	4.4	19	4.8	23	4.5	19	4.8
monthly	35	3.8	21	4.0	14	3.5	21	4.1	14	3.6
weekly	113	12.3	66	12.7	46	11.6	66	12.8	45	11.5
daily	529	57.7	305	58.7	224	56.6	304	59.1	224	57.0
e. portable computer or mini-computer										
cannot say	—	—	—	—	—	—	—	—	—	—
not at all	692	75.5	436	84.0	255	64.2	430	83.8	253	64.2
less than monthly	60	6.5	29	5.6	31	7.8	29	5.7	31	7.9
monthly	41	4.5	13	2.5	28	7.1	13	2.5	28	7.1
weekly	40	4.4	16	3.1	24	6.0	16	3.1	24	6.1
daily	84	9.2	25	4.8	59	14.9	25	4.9	58	14.7

TABLE 3. The Results (Significance, Sig.) of Statistical Analyses for Question 13 Using Young Adults' Data

	Q13: Have You Had an Ache, Pain or Numbness in the Following Body Part During the Past 12 Months?					
	a	b	c	d	e	f
Source of Variation	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
Main effect						
gender	.062	.332	.001**	.003**	.183	.943
marital status	.106	<.001**	.085	<.001**	.033**	.014**
Q8e	.044**	.056	.717	.132	.708	.046**
Q8b	.001**	<.001**	.052	.163	.650	.272
exhaustion at work	.686	.141	.030**	.190	.160	.017**
Two-way interactions						
gender × marital status	.405	.854	.707	.801	.706	.861
gender × Q8e	.434	.006**	.790	.541	.990	.112
gender × Q8b	.440	.275	.616	.668	.801	.845
gender × exhaustion at work	.029**	.087	.020**	.008**	.793	.661
marital status × Q8e	.092	.209	.747	.514	.384	.643
marital status × Q8b	.209	.142	.590	.913	.254	.101
marital status × exhaustion at work	.167	.157	.255	.060	.165	.148
Q8e × Q8b	.575	.319	.624	.829	.170	.514
Qq8e × exhaustion at work	.032**	.013**	.032**	<.001**	.334	.002**
Q8b × exhaustion at work	<.001**	<.001**	.011**	.003**	.223	<.001**

Notes. $^{**}p < .05$; a—in wrists and fingers, b—in elbows and forearms, c—in neck, d—in shoulders, e—in hip and lower back, f—in feet; Q8b—use of desktop computer at leisure, Q8e—use of portable computer or mini-computer at leisure.

3.2. Statistical Analyses Using the Young Persons' Data

Table 3 shows the results of statistical analyses for Question 13 using the model with exhaustion at work (all data). Q8e and Q8b had an association with Q13a. Marital status and Q8b associated with Q13b. Gender and Q16c had an association with Q13c. Gender and marital status had an association with Q13d, and marital status had an association with Q13e. Marital status, Q8e and Q16c had an association with Q13f. Table 3 shows some associations can also be seen from two-way interactions.

3.3. Statistical Analyses Using the Young Women's and Men's Data

Tables 4–5 present young women's and men's results from Question 13 using the model with exhaustion at work. In young women's data, occupation had an association with Q13a and Q13e; Q8b had an associtation with Q13b, Q13d and Q13e; Q16c had an association with Q13a, Q13b, Q13d and Q13e. In young men's data, occupation had an association with Q13b and Q13e; Q8e had and association with Q13c and Q13e; Q8b had an associtation with Q13b, Q13c and Q13e; Q16c had an association with Q13c, Q13d and Q13e. Tables 4–5 show some associations from two-way interactions.

3.4. Statistical Analyses Using Occupational Activity and the Use of Computers

Table 6 shows subgroups 2–6. Subgroup 1 became too small to be analysed adequately. In subgroup 2, Q8e had an association with Q13a and Q13b. In subgroup 3, Q8b had an associtation with Q13b and Q13e. In subgroup 4, Q8e had an associtation with Q13a, and in subgroup 5, Q8e had an associtation with Q13b, Q13e and Q13f. In subgroup 6, Q8b and Q8e had associtations with Q13a and Q13b. In addition, there were some associations on marital status, gender, and exhaustion at work.

TABLE 4. The Results (Significance, Sig.) of Statistical Analyses for Question 13 Using Young Womens' Data

	Q13: Have You Had an Ache, Pain or Numbness in the Following Body Part During the Past 12 Months?				
	a	b	c	d	e
Source of Variation	**Sig.**	**Sig.**	**Sig.**	**Sig.**	**Sig.**
Main effect					
occupation	.033**	.269	.844	.122	.014**
Q8e	.659	.272	.563	.424	.596
Q8b	.323	.012**	.515	.034**	.018**
marital status	.626	.996	.588	.085	.147
exhaustion at work	.024**	.029**	.119	.047**	.001**
Two-way interactions					
occupation × Q8e	.126	.071	.860	.065	.946
occupation × Q8b	.017**	.001**	.273	.002**	.012**
occupation × marital status	.782	.007**	.743	.008**	.242
occupation × exhaustion at work	.005**	.915	.495	.018**	.382
Q8e × Q8b	.045**	<.001**	.799	.316	.138
Q8e × marital status	.265	.734	.837	.421	.616
Q8e × exhaustion at work	.213	.367	.642	.684	.678
Q8b × marital status	.485	.137	.929	.806	.668
Q8b × exhaustion at work	.003**	.773	.884	.370	.805
marital status × exhaustion at work	.072	.560	.661	.228	.990

Notes. $^{**}p < .05$; a—in wrists and fingers, b—in elbows and forearms, c—in neck, d—in shoulders, e—in hip and lower back, f—in feet; Q8b—use of desktop computer at leisure, Q8e—use of portable computer or mini-computer at leisure.

TABLE 5. The Results (Significance, Sig.) of Statistical Analyses for Question 13 Using Young Mens' Data

	Q13: Have You Had an Ache, Pain or Numbness in the Following Body Part During the Past 12 Months?				
	a	b	c	d	e
Source of variation	**Sig.**	**Sig.**	**Sig.**	**Sig.**	**Sig.**
Main effect					
occupation	.136	.003**	.068	.522	.048**
Q8e	.062	.210	.008**	.219	.034**
Q8b	.610	.031**	.015**	.108	.011**
marital status	.768	.867	.362	.129	.725
exhaustion at work	.147	.556	<.001**	<.001**	<.001**
Two-way interactions					
occupation × Q8e	.002**	<.001**	.125	.678	.798
occupation × Q8b	.912	.997	.661	.842	.105
occupation × marital status	.644	.696	.552	.593	.923
occupation × exhaustion at work	.017**	.091	.211	.006**	.142
Q8e × Q8b	.799	.995	.599	.952	.142
Q8e × marital status	.675	.841	.971	.754	.628
Q8e × exhaustion at work	.308	.096	.279	.024**	.395
Q8b × marital status	.715	.413	.420	.650	.889
Q8b × exhaustion at work	.682	.031**	.033**	.002**	.004**
marital status × exhaustion at work	.336	.271	1.000	.005**	.890

Notes. $^{**}p < .05$; a—in wrists and fingers, b—in elbows and forearms, c—in neck, d—in shoulders, e—in hip and lower back, f—in feet; Q8b—use of desktop computer at leisure, Q8e—use of portable computer or mini-computer at leisure.

TABLE 6. The Results (Significance, Sig.) of Statistical Analyses for Question 13 Using Subgroups Based on Occupational Activity and the Use of Computers

	Q13: Have You Had an Ache, Pain or Numbness in the Following Body Part During the Past 12 Months?					
	a	b	c	d	e	f
Source of Variation	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
Subgroup 2						
gender	1.000	.708	.708	.708	.708	.738
marital status	—	—	—	—	—	—
Q8e	<.001*	.003*	.331	.065	.398	.996
Q8b	1.000	.356	.356	.356	.356	.670
exhaustion at work	—	—	—	—	—	—
Subgroup 3						
gender	.875	.478	.383	.034*	.552	.690
marital status	.030*	<.001*	.719	.599	.870	.088
Q8e	.842	.632	.650	.575	.381	.094
Q8b	.444	.029*	.371	.937	.031*	.866
exhaustion at work	.505	.118	.030*	.244	.010*	<.001*
Subgroup 4						
gender	.056*	.645	.107	.549	.174	.024*
marital status	.008*	.748	.911	.064	.235	.066
Q8e	.006*	.966	.649	.298	.378	.304
Q8b	.725	.962	.827	.125	.660	.780
exhaustion at work	.004*	.994	.090	.991	.032*	.009*
Subgroup 5						
gender	.759	.442	.398	.886	.022*	.041*
marital status	.430	.712	.559	.753	.223	.289
Q8e	.303	.047*	.850	.210	.007*	.022*
Q8b	.295	.981	.827	.106	.069	.147
exhaustion at work	.149	.086	.038*	.487	.048*	.177
Subgroup 6						
gender	.633	.505	.002	.016*	.950	.557
marital status	.236	.702	.070	.005*	.660	.286
Q8e	.107	.028*	.740	.332	.769	.114
Q8b	.001*	.001*	.152	.071	.705	.490
exhaustion at work	.183	.118	.185	.481	.054	.065

Notes. $^{**}p < .05$; a—in wrists and fingers, b—in elbows and forearms, c—in neck, d—in shoulders, e—in hip and lower back, f—in feet; Q8b—use of desktop computer at leisure, Q8e—use of portable computer or mini-computer at leisure. Subgoups: 2—occupationally nonactive and using a computer at leisure; 3—occupationally active, not using a computer either at work or at leisure; 4—occupationally active, not using a computer at work but using it at leisure; 5—occupationally active, using a computer at work but not at leisure; 6—occupationally active, using a computer at work and at leisure.

4. DISCUSSION

4.1. Evaluation of Methods

The population was 15 000 Finns and the number of responses was 6121, which is quite high. Therefore, it was possible to analyse the subgroup of persons 30 years old or younger. The subgroup included 1563 persons. In the questionnaire the new technical units included desktop computers, portable computers, hand-held computers, communicators, the internet, mobile phones, electronic marketplaces/ commerce, teletex, digital television and associated services. Young adults might also use other equipment or services, e.g., computer games. However, the questionnaire was planned for the working-age population (18–65), so we did not ask about further equipment or services.

In addition, one alternative of occupations was "home work and student". Therefore we could not analyse the student subgroup, because the alternative also included home work. This is a weakness in the questionnaire.

There were also different types of biases in the study. The questionnaire and questions can influence participants and only active persons returned the questionnaire. Moreover, opinions, especially young adults', can change quite quickly, as the technology develops. Participants do not understand symptoms in the same way and the questionnaire did not include all possible questions or symptoms. There can also be other factors which can influence the symptoms, e.g, stress of student life.

4.2. Use of New Technical Equipment

Over 90% of young adults used mobile phones daily at leisure and ~41.6% of all young adults used mobile phones daily at work. The use of desktop computers was higher at work than at leisure. For example, 31.8% of young women used a desktop computer daily at leisure, and 58.7% used it daily at work. In the men's group the daily use at work was 56.6% and at leisure 46.4%. At leisure men used desktop computers more than women, but at work the use was similar. The use of portable computers or mini-computers was not very popular in young adults. At work 14.9% of men used a portable computer or mini-computers daily; for women, the percentage was 4.8%. The percentage was quite small. It is possible that young adults used different extra functions of mobile phones and they did not need portable or mini-computers. In addition, our data was collected some years ago, so perhaps nowadays the use is higher. The situation is different if we analyse all alternatives of use, not only daily use. However, the use of portable computer or mini-computer is still quite small, because 67.9% of all answered *not at all* at leisure and 75.5% of all answered *not at all* at work.

4.3. Evaluation of Physical Symptoms

In the young adult's data, 53.3% of all persons had pain, numbness or aches in neck *pretty often* or more frequently, 32.2% had aches in hips and lower back, 22.1% in shoulders, 19.3% in feet, 13.4% in wrists or fingers and 5.1% in elbows or forearms. Young women had more pain, numbness or aches in neck (65.0%) than men (34.5%). Another Finnish study showed pain in neck/shoulder 48%, pain in arms and shoulders 32% and pain in wrists and fingers 19% [14]. In our data, the values are at the same level as in the other study. However, in this paper we used only young adults' (30 years old or younger) data.

In statistical analyses (one-way interaction) of all young adults' data, Q8e had an association with an ache, pain or numbness in wrists, fingers and feet. Q8b associated with an ache, pain or numbness in wrists, fingers, elbows or forearms. In addition, the gender, marital status and exhaustion at work had an association with an ache, pain or numbness in some parts of the body. In young women's data Q8b associated with physical symptoms in elbows, forearms, shoulders and hip and lower back, but Q8e had no assocation with women's physical symptoms. In young men's data the use of both portable and desktop computers associated with physical symptoms in neck, hip and lower back. In addition, the occupation and exhaustion at work had some association with physical symptoms.

Referring to Table 6, we found some associations between the use of portable computers, and some physical symptoms. In subgroups 4 and 6, in which the persons used computers at leisure, Q8e had an association with an ache, Q13a or Q13b. In addition, in sub-group 6 Q8b was associated with an ache, pain or numbness in wrists, fingers, elbows or forearms. Therefore, ergonomic conditions should be checked also at home, not only at work.

In subgroup 3 (occupational activity, not using computers) exhaustion at work was associated with Q13c, Q13e and Q13f. Therefore, in the future, it is also important to analyse psychological issues (at work and at leisure), if a young person has physical symptoms. In our data Q8e had a few more associations with questions

on physical symptoms than Q8b. Perhaps we use portable computers more in places where the workplace is not as ergonomic as the place where we use desktop computers. So, it is important that users of laptops themselves take care that the workplace is ergonomic in different places.

Based on our data, the use of computers can be one reason for young adults' physical symptoms in different parts of the body. Women's symptoms are in somewhat different parts of the body than men's. However, the selection of the statistical model may have influenced the results, because if we used another mental symptom in the model, the associations could have been different. We cannot say exactly in which part of the body the physical symptoms generally are, but we found some associations between the use of computers and young adults' symptoms.

In addition, mental symptoms had quite often some associations with physical symptoms. In this paper, we presented models with exhaustion at work, because exhaustion at work was the most common mental symptom in the young adults' age group. In our earlier publication, we wrote that in all the data of our study the physical symptoms were associated with mental symptoms [20]. We can see the same in the young adult's age group. In the future, it is important to take into account that the ergonomic issues of computers and exhaustion at work can influence young adults' physical symptoms, or can be a risk factor for them getting physical symptoms.

5. CONCLUSION

In conclusion, it can be stated that 65.0% of young Finnish women (30 years old or younger) had *pretty often* or more frequently experienced pain, numbness and aches in the neck, and 34.5% of young men had *pretty often* or more frequently the same symptoms. Based on statistical analyses of young women's and men's data the use of desktop computer at leisure quite often had an association with some physical symptoms. In young men's data the use of portable computers or mini-computers at leisure also associated with physical symptoms. The occupation and exhaustion at work also had in some cases associations with physical symptoms. In the future, it is essential to note ergonomics reasons when young persons experience pain, e.g., in the neck or in other parts of the body.

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